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## Activities of the organizations of the United Nations system in the field of freshwater resources

### Report of the Secretary-General

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# I. Introduction

1. The present report has been prepared pursuant to Economic and Social Council agreed conclusions 1997/3, by which the Council urged the ACC Subcommittee on Water Resources[1] to analyse in detail the activities that are currently being carried out by the organizations of the United Nations system in the field of freshwater resources, and the interrelationship between them, and requested the Secretary-General to prepare a report by the end of 1997, as an input into the preparatory process leading up to the sixth session of the Commission on Sustainable Development.

2. Section I summarizes both the involvement of and cooperative arrangements among the organizations of the system. Section II focuses on strategic responses of the United Nations system to challenges faced by Governments and the international community in striving towards the sustainable development and utilization of water resources. A comprehensive review of cooperative arrangements among organizations of the system in the field of water resources was provided in the report of the Secretary-General on freshwater, including clean and safe water supply and sanitation (E/1997/70),which was submitted to the Economic and Social Council at the coordination segment of its substantive session of 1997.

# II. Nature and interrelationship of the activities of the organizations of the United Nations system in the field of water resources

3. The activities of the organizations of the United Nations system in the field of water resources are wide-ranging in scope and nature. Table 1 describes the involvement of organizations in specific aspects of water resources assessment, development and management, based on the programme areas of chapter 18 of Agenda 21. The three main natures of activity are (a) data gathering/analysis and preparation of studies and reports, (b) organization and servicing of meetings and workshops and (c) technical cooperation, including advisory services and field projects. Table 2 lists current cooperative arrangements among organizations of the system.

## A. Water for socio-economic development

### 1. Integrated water resources management

4. The Department for Economic and Social Affairs of the United Nations Secretariat provides support to the General Assembly, the Economic and Social Council, the Commission on Sustainable Development, the Committee on Natural Resources and the ACC Subcommittee on Water Resources. The Department functions as the secretariat for the ACC Subcommittee. The Department assists many countries in their efforts to translate the internationally adopted water-related programme of Agenda 21 into country-specific programmes and projects in the context of both the holistic management of water and the integration of water sector plans and programmes into the framework of national, economic and social development plans.

5. United Nations Environment Programme (UNEP) activities include assistance to Governments in the development of integrated river basin management plans for sustainable water use through its programme on the environmentally sound management of inland waters, and through basin diagnostic studies and action programmes for international river and lake basins. As Chair of the Water Working Group of the United Nations System-wide Special Initiative on Africa, UNEP is working to coordinate United Nations agency efforts to achieve specific social, economic and environmental goals in the sustainable use of freshwater resources in the region.

6. United Nations University (UNU) activities in this area focus on river basin governance and the development of new water management tools, which includes preparing detailed assessments of sustainable management challenges in international river basins. The Food and Agriculture Organization of the United Nations (FAO) is involved in the implementation of a number of field projects on integrated watershed management throughout the world, many of which include a focus on achieving environmental stability to protect fresh water resources and satisfy the demand in both upland and lowland areas. United Nations Educational, Scientific and Cultural Organization (UNESCO) activities focus on the organization or facilitation of meetings, conferences and workshops, including a recent international conference on risk, reliability, uncertainty and robustness of water resources systems, a workshop on negotiations on water in areas of conflict and an envisaged regional workshop on international river basins. The United Nations Development Programme (UNDP) funds many projects on integrated water resources development and management in

Table 1
**Involvement of organizations of the United Nations system in the field of water resources, by strategic management function and nature of activity**

| *Strategic management functions* | *Data gathering, analysis and studies* | *Organization and servicing of meetings* | *Technical cooperation* |
|---|---|---|---|
| **A. Water for socio-economic development** | | | |
| Integrated water resources management | DESA, ECA, ECE, ECLAC, ESCAP, ESCWA, UNDP, UNEP, UNU, INSTRAW, FAO, UNESCO, World Bank | DESA, ECE, ECLAC, ESCAP, ESCWA, UNU, FAO, UNESCO | DESA, ECE, ECLAC, ESCAP, ESCWA, UNDP, UNEP, UNU, FAO, World Bank |
| Water for sustainable food production and rural development | ECA, ESCAP, ESCWA, UNEP, FAO, WHO, World Bank | ESCAP, UNEP, FAO | DESA, ECA, ESCWA, UNDP, UNHCR, FAO |
| Water supply and sanitation | DESA, ECE, ECLAC, ESCAP, UNICEF, UNDP, UNEP, Habitat, UNHCR, UNU, INSTRAW, WHO, World Bank | DESA, ESCAP, ECE, World Bank, UNU, INSTRAW, Habitat, UNICEF, WHO | DESA, ESCAP, ESCWA, UNU, INSTRAW, Habitat, UNICEF, UNDP, UNHCR, FAO, WHO, World Bank |
| Water for sustainable urban development | ESCAP, UNDP, UNEP, Habitat, UNESCO, WHO, WMO, World Bank | ESCAP, UNDP, Habitat, UNESCO, WMO | ESCAP, UNICEF, UNEP, Habitat, FAO, UNESCO, WMO |
| Industrial water use | ESCWA, UNEP, UNU, UNIDO, IAEA | UNIDO, IAEA | ECLAC, ESCWA, UNU, UNIDO, IAEA |
| In-stream uses of water resources | ECA, ESCAP, UNEP, World Bank | ESCAP, UNEP, World Bank | DESA, ESCAP, UNDP, UNEP, World Bank, UNIDO |
| Mitigation of water-related natural disasters | ESCAP, IDNDR, FAO, UNESCO, WMO | ESCAP, IDNDR, UNESCO, WMO | DESA, ESCAP, IDNDR, UNDP, FAO, UNESCO, World Bank, WMO |
| **B. Health and productivity of the aquatic environment** | DESA, ECE, ECLAC, ESCAP, ESCWA, CBD, UNFCCC, UNDP, UNEP, UNU, FAO, UNESCO, WHO, World Bank, UNIDO | ECE, ESCAP, CBD, UNFCCC, UNEP, UNU, UNESCO | DESA, ECE, ESCAP, ESCWA, UNDP, UNEP, Habitat, UNU, FAO, UNIDO, WHO, World Bank |
| **C. Information management** | DESA, ECA, ESCAP, ESCWA, FAO, IAEA, World Bank, UNICEF, UNESCO, UNEP, UNU, WHO, WMO | ESCAP, ESCWA, UNICEF, UNESCO, UNU, WHO, WMO, UNEP | DESA, ESCAP, ESCWA, FAO, IAEA, World Bank, UNICEF, UNDP, UNESCO, UNEP, UNU, WHO, WMO |
| **D. Financial assistance** | ECA, ESCWA, ESCAP, UNICEF, UNDP, UNEP, UNU, UNESCO, WHO, World Bank, WMO, IAEA | DESA, ECA, ECE, ECLAC, ESCAP, ESCWA, UNICEF, UNDP, UNEP, Habitat, INSTRAW, IDNDR, UNU, FAO, UNESCO, WHO, World Bank, WMO, UNIDO | Habitat, UNICEF, UNDP, UNU, FAO, UNESCO, WHO, World Bank, WMO, UNIDO, IAEA |
| **E. Capacity-building** | ECLAC, ESCAP, ESCWA, UNICEF, UNDP, UNEP, UNU, INSTRAW, UNESCO, WHO, WMO, IAEA | ESCAP, ESCWA, UNICEF, UNDP, UNEP, UNU, INSTRAW, UNESCO, WHO, WMO, IAEA | DESA, ECLAC, ESCAP, ESCWA, UNICEF, UNDP, UNEP, Habitat, UNU, INSTRAW, IDNDR, FAO, UNESCO, WHO, World Bank, WMO, UNIDO, IAEA |

Table 2
**Current cooperative arrangements among organizations of the United Nations system in the field of water resources, by strategic management function**

| *Strategic management functions* | *Major cooperative arrangements (as per report of the Secretary-General on freshwater, including clean and safe water supply and sanitation: Report of the ACC Subcommittee on Water Resources on its eighteenth session and inputs to this report)* |
|---|---|
| Integrated water resources management | • ACC Subcommittee on Water Resources: DESA, ECA, ECE, ECLAC, ESCAP, ESCWA, UNICEF, UNDP, UNEP, Habitat, UNHCR, UNU, INSTRAW, CBD, CCD, UNFCCC, IDNDR, FAO, UNESCO, WHO, World Bank, WMO, UNIDO and IAEA<br>• ACC Subcommittee Working Group on Integrated Approaches to Land and Water Management: DESA, FAO, IAEA, UNICEF, ESCAP, UNESCO, UNEP and WHO<br>• Joint Programme on Integrated Land and Water Management: FAO and UNESCO<br>• Interagency Committee on Water Resources in Africa: ECA and several other ACC Subcommittee members<br>• Interagency Committee on Water Resources in Asia and the Pacific: ESCAP and several other ACC Subcommittee members |
| Water for sustainable food production and rural development | • Effective Planning and Management of Irrigated Agriculture: FAO, UNEP and WMO<br>• Technical Consultation on Sustainable Agriculture and Rural Water Management: FAO, World Bank, UNICEF, UNDP and WHO |
| Water supply and sanitation | • Cooperation and Coordination Mechanisms in Water Supply and Sanitation: Habitat, UNICEF and UNDP<br>• Interagency Steering Committee on Water Supply and Sanitation: DESA, FAO, IAEA, World Bank, INSTRAW, Habitat, UNICEF, UNDP, ECA, ESCAP, ECE, ECLAC, ESCWA, UNESCO, UNEP, UNHCR, UNIDO, UNU, WHO and WMO<br>• Joint Activities towards Universal Access to Water Supply and Sanitation in Asia and the Pacific: DESA, World Bank, INSTRAW, UNICEF, UNDP, ESCAP and WHO<br>• Joint Initiative on Participatory Methods for Hygiene Behaviour Change and Sanitation: World Bank, UNICEF, UNDP, WHO<br>• Joint Initiative on Prevention and Control of Water-related Diseases in Europe: ECE, UNEP and WHO<br>• Joint Monitoring Programme (JMP) for Water Supply and Sanitation: UNICEF and WHO<br>• Memorandum of Understanding on Water and Environmental Sanitation: World Bank and UNICEF<br>• Promotion of Sustainable Water Supply and Sanitation Programme: World Bank, UNDP and WHO<br>• Water Supply and Sanitation Programme: World Bank and UNDP<br>• Water Supply and Sanitation Programme in Rural Areas: DESA, UNDP and UNCDF (United Nations Capital Development Fund)<br>• Water Working Group of the System-wide Special Initiative on Africa: DESA, FAO, IAEA, World Bank, Habitat, UNICEF, UNDP, ECA, UNESCO, UNEP, UNIDO, WHO and WMO |
| Water for sustainable urban development | • Collaboration on Urban Sanitation Technologies: Habitat and UNICEF<br>• Urban Hydrology Cooperation Project: UNESCO and WMO |
| Industrial water use | • Collaboration on Industrial Pollution Prevention and Abatement Guidelines: UNEP, WHO, World Bank and UNIDO |
| In-stream uses of water resources | • Global Research Initiative on Ecohydrology: UNDP and UNESCO |
| Mitigation of water-related natural disasters | • Implementation of the International Decade for Natural Disaster Reduction: IDNDR and WMO<br>• Typhoon Committee and Panel on Tropical Cyclones: ESCAP and WMO<br>• World Climate Programme/Water: UNESCO and WMO |

| *Strategic management functions* | *Major cooperative arrangements (as per report of the Secretary-General on freshwater, including clean and safe water supply and sanitation, Report of the ACC Subcommittee on Water Resources on its eighteenth session and inputs to this report)* |
|---|---|
| Health and productivity of the aquatic environment | • ACC Subcommittee Steering Committee for Implementation of the GPA: DESA, FAO, UNESCO, UNEP, UNU, WHO and WMO<br>• ACC Subcommittee Water Quality Initiative: DESA, UNESCO, UNEP, UNU and WHO<br>• Global Freshwater Quality Monitoring Programme (GEMS)/Water: ECE, UNESCO, UNEP, WHO and WMO<br>• Panel of Experts on Environmental Management for Vector Control (PEEM) FAO, Habitat, UNEP and WHO |
| Information management | • ACC Subcommittee Internet Modernization Project: DESA, UNU and other ACC Subcommittee member agencies<br>• African Water Resources Assessment Strategy: ECA and WMO<br>• Global Information Network on Activities of the United Nations System in the Field of Water Resources: DESA, UNU and other ACC Subcommittee member agencies<br>• Inter-agency Working Agreement on Water Resources Assessment: UNESCO and WMO<br>• Joint Project on GIS Application to Water Resources: FAO and UNESCO<br>• Water and Sanitation Monitoring System (WASAMS): UNICEF and WHO<br>• World Hydrological Cycle Observing System (WHYCOS): World Bank and WMO |
| Financial assistance | • [most cooperative arrangements mentioned in this table involve some financial assistance] |
| Capacity-building | • 1998 World Water Day Celebration: DESA, UNICEF and other ACC Subcommittee member agencies<br>• Joint Initiative on School Water Supply, Sanitation Hygiene Education: UNICEF and WHO<br>• Women, Water Supply and Sanitation Training Package: DESA, INSTRAW, ILO, UNDP, ESCAP and UNICEF |

all developing country regions. The World Bank also provides loans and technical assistance to dozens of ongoing projects in the area of natural resources management in many developing countries.

7. With regard to the regional commissions, the Economic Commission for Africa (ECA) focuses on the production of technical documents on options for integrated water resources management in selected African countries. The Economic and Social Commission for Asia and the Pacific (ESCAP) has been responsible for several workshops and seminars, publications and advisory missions to countries in the region, especially in the area of integrated river basin planning. The Economic Commission for Europe (ECE) activities focus mainly on support for the implementation of the 1992 Convention on the Protection and Use of Transboundary Watercourses and International Lakes, including providing assistance to countries with economies in transition for the protection and management of transboundary waters, integrated management of water and related ecosystems, and land-based pollution control. The Economic Commission for Latin America and the Caribbean (ECLAC) focuses on promoting policies for establishing or strengthening institutions at the river basin level and on assistance in the field of water law. The Economic and Social Commission for Western Asia (ESCWA) has organized several expert group meetings and provided advisory services to its member States, particularly in the areas of optimal utilization of shared water resources, water legislation and the impact of water pricing on water demand.

### 2. Water for sustainable food production and rural development

8. FAO is currently responsible for about 100 technical cooperation projects in the area of water for food production and rural development. Because of the dominant role of agricultural water use in many regions of the world, such projects bear a strong relationship to the integrated management of water resources. Its International Action Programme on Water and Sustainable Agricultural Development incorporates broad reviews of national water sectors, including river basin master planning, management issues and environmental sustainability, and is the major FAO instrument for assisting United Nations Member States in implementing water policies for sustainable agricultural development and management, as defined in chapter 18 of Agenda 21. The FAO Special Programme for Food Security is designed to enhance the food production capacity of low-

income food-deficit countries; the water sector of this programme aims to provide assistance to Governments in expanding low-cost, medium-scale and small-scale irrigation. FAO promotes water-harvesting techniques in arid and semi-arid areas in order to alleviate water shortages associated with supplementary irrigation techniques in crop production. It also executes many field projects on the use of marginal quality waters, such as saline drainage water and municipal or industrial wastewater, and promotes the transfer of small-scale irrigation technologies for peri-urban areas in developing countries.

9. The World Bank provides loans and technical assistance to irrigation and drainage projects in developing countries and those with economies in transition. UNDP also funds several ongoing projects on improving water resources management for agricultural use. UNDP, the World Bank, FAO and the International Commission for Irrigation and Drainage are the co-sponsors of the International Programme for Technology Research in Irrigation and Drainage, which assists countries in the identification of critical research and development gaps, the formulation of research and development projects and the mobilization of donor support. The Office of the United Nations High Commissioner for Refugees (UNHCR) operational activities include the development of emergency water facilities to meet the agricultural requirements of refugee communities in such a way that the level of technology and long-term operation and maintenance are compatible with the capacity of the beneficiary communities.

10. ECA is currently preparing a major technical document on fisheries as a contribution to food security in Africa. ESCAP recently held two workshops on irrigation water supply and on pricing policies for urban and rural water supply, both of which resulted in the subsequent publication of technical documents. ESCWA is currently carrying out a study on the development of non-conventional sources of freshwater resources in rural areas, including desalination, wastewater reuse, use of marginal water and water harvesting, and a comprehensive regional evaluation of progress in the implementation of chapter 18 of Agenda 21, with particular emphasis on sustainable agricultural production.

### 3. Water supply and sanitation

11. As secretariat of the Inter-Agency Steering Committee on Water Supply and Sanitation, the World Health Organization (WHO) acts as a focal point in the United Nations system for fostering cooperation in this programme area. Its water supply and sanitation activities, both in terms of studies and field projects, focus primarily on human settlements, basic services, health, water quality and behavioural change. The WHO Drinking-Water Quality Guidelines are promoted through regional workshops and country consultations, while surveillance of drinking water is supported with training and provision of analytical tools. The WHO country-based Africa 2000 initiative aims to accelerate investment in water supply and sanitation in the region by means of a new partnership between countries and the external development community.

12. The United Nations Children's Fund (UNICEF) has also historically played a leading role in this area, in particular by supporting the capacity-building of Governments and communities in over 100 countries in their efforts to increase the coverage of access to safe drinking water and environmental sanitation, with a focus on the rights of the child to a safe environment, safe water and sanitation for survival, and the protection and development of children and their mothers. UNICEF has often used this intervention to mainstream gender issues and promote the empowerment of women by supporting a project for women hand pump caretakers, women-managed water committees, sanitation programmes and micro-credit schemes for income generation, often in close cooperation with the International Research and Training Institute for the Advancement of Women (INSTRAW) and other institutions. The UNICEF Strategy on Water and Environmental Sanitation stresses the need for greater attention to environmental sanitation, hygiene promotion, development and field testing of the low cost appropriate technologies for water supply and sanitation, operation and maintenance centred on vulnerable groups, including the urban poor, and capacity-building of private entrepreneurship through training and technology transfer in the production and marketing of hand pumps, drilling rigs and other water technologies.

13. UNDP and the World Bank both provide substantial funds and technical assistance to developing countries and economies in transition for projects in both urban and rural areas. The UNDP/World Bank Water and Sanitation Programme promotes investments in the water and sanitation sector by supporting communities and Governments through capacity-building, enhancing the involvement of stakeholders in the selection, operation and maintenance of systems, and fostering the involvement of the private sector, non-governmental organizations and user groups.

14. The Department of Economic and Social Affairs of the United Nations Secretariat, in collaboration with UNDP and the United Nations Capital Development Fund, has been involved in cooperative efforts to assist developing countries, particularly least developed countries, in the

management of water supply and sanitation programmes in rural areas. These programmes are usually linked to national programmes for poverty eradication, income generation, enhancing the role of women in economic and social development, and other developmental efforts. The United Nations Centre for Human Settlements (Habitat), in collaboration with UNICEF, as well as with a number of other organizations outside the United Nations system, promotes the development and use of urban sanitation technologies to expand access to water supply and sanitation services for the urban poor. UNHCR water-sector activities aim to foster a preventive health approach in favour of the beneficiaries of refugee assistance programmes throughout the world. INSTRAW is the major advocate for the role of women in water supply and sanitation within the United Nations system, and in that capacity has prepared policy statements for various intergovernmental meetings, produced two multi-media training packages on women, water supply and sanitation, and conducted national, subregional and regional training seminars in cooperation with the Department of Economic and Social Affairs, UNICEF, UNDP and ESCAP. FAO activities in this field are limited to interventions within integrated rural development initiatives.

15. ESCAP activities in this area focus on the mobilization of community participation and resources to contribute to providing universal access to water supply and sanitation. These activities have been carried out mostly in collaboration with other United Nations agencies, particularly the Department of Economic and Social Affairs, INSTRAW, UNICEF, WHO, UNDP and the World Bank. Activities in this area have included the organization of workshops and seminars in the region, in particular four national workshops on the use of the training modules of the above-mentioned training package on women, water supply and sanitation. ECE focuses mainly on support for the implementation of the water supply and human health objectives of the above-mentioned Convention on the Protection and Use of Transboundary Watercourses and International Lakes. Together with WHO, UNEP and the European Commission, ECE is preparing an international instrument on the prevention, control and reduction of water-related diseases, to be presented to the 1999 London Ministerial Conference on Environment and Health. ECLAC activities in this area focus on private participation in water supply and sanitation and its regulation, including the provision of advice to countries of the region. ESCWA activities in this area focus on providing advisory services to member States, such as, advice to Qatar on the management of drinking water in rural areas.

### 4. Water for sustainable urban development

16. The United Nations Conference on Human Settlements (Habitat II) preparatory process included an international conference on managing water resources for large cities and towns, held at Beijing in March 1996 and organized by Habitat, in cooperation with the Department of Economic and Social Affairs, UNEP and other United Nations bodies. The declaration adopted by the Conference focused on the urgency of undertaking greater efforts to promote management for improving the efficiency of water use, as well as the importance of innovative financing mechanisms and broad-based partnerships bringing together the public and private sectors and local communities. As the first major follow-up to Habitat II, Habitat and UNDP, in collaboration with major African non-governmental organizations organized an international consultation on partnerships in the water sector for cities in Africa, held at Cape Town, South Africa, in December 1997. The consultation addressed the need for a broad-based partnership approach to meet the rapidly growing water demand in African cities. As the focal point for this programme area within the United Nations system, Habitat is also involved in other initiatives, such as a project on the integrated management of urban water resources by promoting partnerships among local authorities, the private sector, non-governmental organizations and community user associations.

17. Activities by other organizations include World Meteorological Organization (WMO) and UNESCO initiatives on urban hydrology; the UNEP promotion of environmental impact assessments of human water use in peri-urban areas and of environmental technologies focusing on the water needs of urban areas; and the ESCAP organization of several workshops and undertaking of many advisory missions to improve urban water resources management. Both UNDP and the World Bank fund several projects with components focusing on sustainable urban water resources development and management.

### 5. Industrial water use

18. Current United Nations Industrial Development Organization (UNIDO) programmes and projects focus on the design and application of infrastructure for industrial water use and water treatment in industrial processes; improving efficiency of industrial water use, including recycling and conservation; and industrial effluent reduction.

UNIDO acts as a clearing house for information on industrial water use, and provides assistance in the manufacture of water supply and treatment equipment. UNEP is currently working on the development of a benchmark publication on environment, water and sustainable development that includes a review of industrial water use. IAEA activities in this area focus on the efficient utilization of water for cooling purposes in the nuclear industry, and on the use of nuclear energy for the desalination of sea water. ECLAC activities are related to environmental management in the mining industry.

### 6. In-stream uses of water resources

19. Both UNDP and the World Bank have funded several projects involving specific in-stream uses of water resources, in particular hydroelectric dams, in recent years. A workshop on the future of large dams jointly hosted by the World Bank and the World Conservation Union, held at Gland, Switzerland, in April 1997, brought together leading experts and major stakeholder representatives from Governments, civil society, international organizations and the private sector. As an outcome of the workshop, a two-year world commission on dams is being set up to assess the experience of large dams and evaluate their development effectiveness; develop decision-making criteria, policy and regulatory frameworks for assessing alternatives to energy and water resources development; develop internationally accepted standards for large dams, including the promotion of best practices; and identify the implications for institutional, policy and financial arrangements so that benefits, costs and risks are equitably shared at the global, national and local levels.

20. The Department of Economic and Social Affairs provided support for a small-scale hydropower project. ECA is undertaking a study of the economic viability of manufacturing turbines and generators for mini-hydro projects in Africa. ESCAP is implementing a programme for Asian cooperation on energy and the environment, which includes a management component focusing on private sector participation in hydropower generation and its consequences on environmental quality. UNIDO works with energy ministries, utilities and private energy companies to raise awareness of new and innovative ways of financing more efficient power-generating capacity, including several hydropower projects worldwide.

### 7. Mitigation of water-related natural disasters

21. The secretariat of the International Decade for Natural Disaster Reduction (IDNDR) is involved in the implementation of its risk assessment tools for diagnosis of urban areas against seismic disaster projects. The secretariat also runs annual public awareness-raising campaigns; the theme in 1997 was "Water: too much, too little ... leading cause of natural disasters". It also implements pilot activities to reduce risk of water-related natural disasters in selected small island States, and as a task force on floods in Central and Eastern Europe. The secretariat works closely with WMO to ensure that the General Assembly and other intergovernmental bodies are appraised of the importance of establishing and maintaining appropriate and cost-effective early warning systems. The findings of two reports on the improvement of early-warning capacities submitted to the General Assembly in 1995 and 1997 will form the basis for the International Conference on Early-Warning for Natural Disasters, to be held at Potsdam, Germany, in 1998.

22. As part of its basic mission, WMO coordinates national activities for monitoring and forecasting floods and droughts. WMO works with UNESCO on water-related aspects of the World Climate Programme, including the planning of the Second International Conference on Climate and Water, to be held in Finland in August 1998. As part of activities related to integrated water resources management in arid and semi-arid zones, UNESCO is implementing a project entitled "Coping with water scarcity", and is organizing an international conference on drought management, to be held in South Africa in 1998. Under the aegis of a project entitled "Non-structural flood control measures to balance risk-cost-benefit in flood control management in urban areas", UNESCO plans to develop a real-time urban flood management decision support system in a pilot basin within the São Paulo, Brazil, metropolitan area, and to hold a workshop on non-structural flood control in urban areas, also at São Paulo, in April 1998. A document entitled, "Impacts of climate change and climate variability on hydrological regimes" will soon be published as part of the UNESCO International Hydrology Series.

23. The Department of Economic and Social Affairs has been involved in activities related to integrated flood and typhoon management for small islands and in projects dealing with the mitigation of extreme meteorological events in the South Pacific and the Persian Gulf. ESCAP work on natural disaster reduction includes the organization of a major regional workshop, held at Bangkok in March 1997, on appropriate land-use planning and watershed management to reduce damage owing to water-related disasters; the publication of a detailed study entitled "Natural hazards and

natural disaster reduction in Asia and the Pacific"; the annual celebration of IDNDR Day in the region; and the provision of advisory services to countries on water-related natural disasters. In cooperation with WMO, ESCAP continues to support the efforts of the Typhoon Committee and the Panel on Tropical Cyclones. FAO assists several countries in the establishment of flood protection and management systems. The World Bank provides loans and technical assistance to many projects throughout the developing world, particularly in the area of flood protection. UNDP also funds several projects is this area, including two programmes to save the Aral Sea and two projects on drought prevention in Ethiopia.

## B. Health and productivity of the aquatic environment and impact on human health of the degradation of water resources

24. The water quality monitoring programme of the Global Environment Monitoring System (GEMS/Water), co-sponsored by WHO, UNEP, WMO and UNESCO, constitutes the major United Nations system for water quality monitoring. Global and regional assessments on water quality have been carried out, including on ground water quality in Asia and the Pacific and on water quality problems in the former USSR. A global register of rivers flowing into the oceans has also been established to provide pollutant fluxes for more than 400 rivers worldwide. Institutional support for GEMS/Water data gathering and analysis is provided by the Global Water Quality Data Centre and the Global Runoff Data Centre, located in Canada and Germany, respectively.

25. UNEP, as secretariat of the Global Programme of Action for the Protection of the Marine Environment from Land-based Activities, facilitates the implementation of the water quality components of the programme. The Department of Economic and Social Affairs is collaborating with government organizations to enhance national capacity to address the problem of water pollution, by establishing control measures for major industries and commercial enterprises, encouraging the reuse and recycling of wastewaters, and improving agricultural practices. The World Bank provides significant loans to projects dealing with environmental protection of freshwater resources. UNDP also funds many ongoing projects in this programme area, including three separate projects on reversing environmental degradation in the Aral Sea and an emergency water hyacinth reduction programme on Lake Victoria. UNU has several activities dealing with water monitoring, including the Asia-Pacific Mussel Watch programme. UNIDO activities to prevent and control land-based sources of industrial pollution include the implementation of a major project aimed to protect and restore the health of the large marine ecosystem of five countries in the Gulf of Guinea.

26. The UNESCO International Hydrological Programme is currently implementing two projects, entitled "Interactions between river systems, flood plains and wetlands" and "Comprehensive assessment of surficial ecohydrological processes". Its project on land/inland water ecotones also published two major documents on freshwater biodiversity. The biological diversity of inland water ecosystems was actually the thematic focus of the third meeting of the Subsidiary Body on Scientific, Technical and Technological Advice of the Convention on Biological Diversity, held in September 1997, which put forward recommendations for a work programme on inland water biological diversity. With the legally binding commitments that it contains, the Convention aims to ensure sustainable maintenance of biological diversity, including aquatic biological diversity, thereby contributing to the health and productivity of the aquatic environment. FAO, through its various activities, aims to ensure appropriate water quality for optimum crop, fish and animal production, to enable the safe use and disposal of municipal wastewater in agriculture, and to protect downstream water sources from non-point sources of pollution from agricultural activities. It also conducts activities concerning wetland management and the control of waterlogging and salinization in irrigated lands. FAO and UNESCO are jointly responsible for the implementation of an integrated land and water management programme aimed to prevent the pollution of groundwater due to agricultural practices.

27. The disease control and eradication programmes of WHO, notably its programmes for diarrhoeal diseases, guinea worm, schistosomiasis and river blindness, as well as the joint WHO/FAO/UNEP/Habitat Panel of Experts on Environmental Management for Vector Control (PEEM), have had a significant impact on the way in which water resources are being managed in many countries. PEEM is collaborating with the World Conservation Union in a project on conservation and resource utilization in selected wetlands of the Zambezi River basin, and is actively involved in the promotion of environmental management for vector control in dams and reservoirs for hydropower generation. In collaboration with the London School of Hygiene and Tropical Medicine and the United Kingdom Overseas Development Institute, PEEM is producing guidelines on urban environmental management for disease

vector control, and is promoting disease vector control through agricultural extension programmes.

28. The Global Environment Sanitation Initiative, as endorsed by the Fourth Global Forum of the Water Supply and Sanitation Collaborative Council, held at Manila from 3 to 7 November 1997, in which ACC Subcommittee members are taking a leading role, is another good example of system-wide action to improve the current situation in the area of environmental sanitation.

29. ESCAP activities in this area include the organization of an expert group meeting on the protection of water resources, water quality and aquatic ecosystems, a workshop on water-related problems in low-lying coastal areas, the publication of a document entitled "Protection of water Resources, water quality and aquatic ecosystems in Asia and the Pacific", and several advisory missions. ECE involvement in the implementation of the 1992 Convention on the Protection and Use on Transboundary Watercourses and International Lakes also includes several activities related to protection of water resources. ECLAC activities centre on the formulation of alternative instruments for the management of water quality in freshwater bodies, and on coastal and estuarine areas. ESCWA activities include studies on water quality and water pollution in selected urban areas, and on the harmonization of environmental standards in the water sector of its member States, as well as the provision of advisory services in support of sustainable water resources management.

## C. Information management

30. WMO has taken the lead in efforts to improve the capacity of national and regional water resources assessment services, through programmes like the World Hydrological Cycle Observing System. That initiative is already under way in Mediterranean countries and southern Africa, with the support of the World Bank and other organizations outside the United Nations system, and plans are well advanced in other regions. Related activities include the implementation of the African Water Resources Assessment Strategy adopted by the African Conference on Water Resources, which was convened jointly by WMO and ECA at Addis Ababa in March 1995. WMO is also responsible for several other activities designed to improve water resources assessment and establish networks of hydrological observation stations for monitoring the quality and quantity of both surface and groundwater, including substantial support for the operation of the Global Runoff Data Centre at Koblenz, Germany. UNESCO activities in this area include a project to support international efforts to collect and process hydrological data; several initiatives on urban hydrology, such as two projects on surface and groundwater management in the urban environment and on integrated urban drainage modelling in different climates; and a joint project with FAO on the application of geographical information systems to water resources. In addition to this joint activity, FAO continues to develop its statistical global database on rural water use and irrigation, and has also developed manuals and guidelines to estimate peak floods and annual runoff of small river basins in Africa where no hydrological data exist. UNDP funds several projects is this area, including the Sub-Saharan Africa Hydrological Assessment, in cooperation with the World Bank, a water resources information project in Bangladesh and a groundwater data bank in the Philippines.

31. Through its activities concerning the integrated management of water resources, the Department of Economic and Social Affairs provides policy advice to developing countries for information management. Modern computer technologies and up-to-date groundwater software have been introduced and promoted in many developing countries. The water supply and sanitation Joint Monitoring Programme, established by WHO and UNICEF, is primarily aimed at the development of national capacities for sector monitoring, and as a secondary objective at the preparation of national and international assessments. IAEA technical cooperation programme in isotope hydrology covers a broad spectrum of fields, including applications related to hydrogeological investigations of groundwater and hydraulic interactions (including geothermal systems); applications in surface water systems, including sediment transport and hydro-engineering problems; and analytical techniques related to isotope and chemical analyses of water samples for hydrological applications.

32. ECA is currently preparing an inventory of existing conventions, treaties and agreements on shared water resources in Africa. ESCAP has focused its activities in this area on the introduction of computer applications for the assessment of water resources in its region, through the publication of several documents, the organization of workshops and several advisory missions. ESCWA has been responsible for several activities aimed at improving water resources assessment in western Asia.

## D. Capacity-building to enhance participatory approaches and improve institutional and regulatory frameworks

33. All ACC Subcommittee members are involved, in one way or another, in various capacity-building activities in the field of water resources. UNDP technical cooperation programmes are concentrating their efforts on applying capacity-building strategies for creating an enabling environment with appropriate policy, legal and regulatory frameworks; institutional development, including community participation; human resources development and strengthening of managerial systems; and information networks. The Global Capacity-Building Programme for Sustainable Water Sector Development, which is partly funded by UNDP, is designed to produce a process of capacity-building initiated by a water sector assessment; a nucleus of officials and specialists trained in sustainable water sector development; water sector assessment reports, including planning frameworks; improved cross-sectoral collaboration; and improved coordination among national agencies and external support agencies.

## E. Financing of water resources development and utilization

34. The magnitude of the involvement of organizations of the United Nations system in the field of water resources can be appreciated from the expenditures on technical cooperation activities of the two major funding agencies in the system. UNDP funding to over 121 ongoing water projects in about 60 developing countries and those with economies in transition amounts to US$ 192 million. World Bank loans to 240 water projects (or natural resources projects with major water components) implemented during the 1990s in about 80 developing countries and countries with economies in transition amounted to over US$ 21 billion. In addition, the grants and concessional funds disbursed by the Global Environment Facility (GEF) during fiscal year 1996 amounted to US$ 37.7 million. Also during 1996, the Project Preparation and Development Facility of GEF provided US$ 1.9 million for the formulation of seven projects in this area from the initial concept stage through final design.

35. Several other major United Nations organizations involved in the field of water resources, such as FAO and UNICEF, also provide substantial funds for the implementation of many projects in their respective core areas of activity. Between 1994 and 1996, for example, UNICEF expenditures on water supply and sanitation activities (excluding expenditure on emergency water supply and sanitation activities) amounted to no less than US$ 220 million. In addition, a significant amount of regular budget and extrabudgetary funds is usually allocated by ACC Subcommittee member organizations for activities supporting technical cooperation programmes, including (a) data collection and analysis; (b) preparation of studies and reports; and (c) organization of workshops, seminars and conferences.

36. UNDP is currently involved in the testing of innovative financing mechanisms in Senegal and South Africa aimed at attracting loans from local banks and other credit institutions for community water supply, small-scale irrigation and sanitation. Local banks are interested provided that the project generates a cash flow (from income-generating activities, such as small-scale irrigated agriculture and cottage industry) and their loan can be protected from default by loan guarantees from another bank or fund. Local non-governmental organizations are involved in order to provide technical and administrative support to the communities. The World Bank is also providing increasing attention to programmes that make formal financial services available to the rural and urban poor, including consultation with other donors regarding long-term support and funding for micro-credit programmes, and financial assistance for the establishment or support of financial institutions providing credit for lower-income groups in developing countries. As mentioned above, UNICEF has also promoted the empowerment of women through such initiatives as women-managed water committees and micro-credit schemes for income generation.

# III. Strategic responses by the organizations of the United Nations system

37. Given the complexity of water resources issues and the nature of mandates of different organizations of the United Nations system, a certain amount of overlap and even duplication is, at times, inevitable. It is not possible to have an absolute demarcation of responsibilities. What is of paramount importance is that the organizations proceed on the basis of a common understanding of basic principles and approaches, that they have on-going information about each other's activities in order to enhance cooperation and avoid duplication, and that they increase cooperation concerning country-level activities.

38. The ACC Subcommittee on Water Resources increasingly provides channels of communications through its formal sessions, informal communications and various cooperative arrangements. Additional steps towards enhancing the flow of information are being taken through the linking of World Wide Web sites of the various organizations. In order to improve coordination of activities at the field level, the members of the ACC Subcommittee are now initiating a process of organizing a working group composed of their experts working in the field in support of resident coordinators' efforts.

39. Because of the role of the regional commissions with regard to assistance in implementing Agenda 21 within their respective regions, they can be instrumental in coordinating system-wide activities at the regional level. In this regard, the various coordination efforts being carried out throughout the system, particularly through the Subcommittee, need to benefit from the regular participation of the regional commissions.

40. Governments and the international community face many challenges in the road towards achieving the sustainable development and management of water resources. Approaches and issues regarding the activities of the organizations concerning these strategic questions are described below.

## A. Water for socio-economic development

41. A major challenge facing organizations of the United Nations system is to assist Governments in bringing about coherent institutional approaches by outlining a set of policy and management options based on the principle of efficiency, equity, participation and sustainability. There is now a clear understanding of the need to formulate concerted approaches to integrated water resources development and management. A World Bank policy paper,[2] the general framework formulated by FAO on behalf of the ACC Subcommittee on Water Resources,[3] a report prepared by the former Department of Development Support and Management Services of the United Nations Secretariat for the third session of the Committee on Natural Resources,[4] and the report of a UNDP international symposium on a strategy for water resources capacity-building provide a basis for this common understanding.[5]

42. Notwithstanding the need for integration, the efficient management of sectoral issues remains essential. Nothing short of a major international programme, particularly with regard to environmental sanitation, involving local and national authorities, the international community, non-governmental organizations and the private sector, will suffice to accelerate and sustain the satisfaction of these basic human needs. The management of water resources for agricultural purposes remains essential in order to minimize its wasteful use to control pollution and avoid land degradation.

43. At the country level, efforts to integrate these conceptual approaches are evident in such programmes as the FAO International Action Programme on Water and Sustainable Agricultural Development. Activities concerning water supply and sanitation are increasingly carried out in the context of an integrated approach. Nevertheless, for the most part, cooperation with Governments with regard to sectoral issues does take place in the context of the fragmented institutional arrangements that exist in countries in which such cooperation is taking place. Organizations dealing primarily with sectoral issues, (FAO, WHO, UNICEF, UNIDO) need to work together with those organizations dealing with broader aspects of water resources development and management (Department of Economic and Social Affairs, UNDP, World Bank, FAO and the regional commissions) in order to ensure support in the integrated management efforts of Governments. This can be, and is being achieved, via diagnostic studies conducted by Governments in order to determine institutional constraints and remedies, as well as to define overall priorities, objectives and sectoral requirements.

## B. Health and productivity of aquatic ecosystems and impact on human health of the degradation of water resources

44. The interrelation between land, water resources, the health of coastal areas and oceans and the health of ecosystems is one of the most neglected areas of water resources management. The existing evidence suggests that the economic losses resulting from the loss of natural capital as a result of the degradation of ecosystems and the loss of human productivity from water-borne diseases often far exceeds the short-term benefits that may be derived from development schemes that ignore such consequences.

45. Increased attention is being given by the organizations of the United Nations system to the close relationship that exists between land and water development and the degradation that one can inflict upon the other. Ultimately, however, the effectiveness of these programmes will hinge on the extent to which they become an integral part of the system's concerted efforts in assisting Governments in devising approaches to the integrated management of their

water resources. These programmes need to be seen in the light of the support provided to Governments in the implementation of water-related concerns of the convention on desertification and drought, biological diversity and climate change, and the International Decade for Natural Disaster Reduction, as well as the implementation of the Global Plan of Action for the Protection of the Marine Environment from Land-based Activities and the comprehensive assessments carried out by the Intergovernmental Panel on Climate Change, particularly its second assessment report (see FCCC/SBSTA/1996/7/Add.1, 2 and 3), published in 1995, which includes chapters on hydrology, freshwater ecology and water resources management.

## C. Information management

46. The comprehensive assessment of the freshwater resources of the world (E/CN.17/1977/9) showed that the capability to provide accurate water quality and quantity data is sorely lacking in the majority of countries, and that for years the capacity of hydrology offices in developing countries, particularly in Africa, has been declining. For the most part, knowledge about ground water resources is inadequate. The assessment also concluded that it is difficult to obtain reliable, systematic information on water resources management in most developing countries, and that there is a scarcity of good data on water use and land degradation related to water use. The hardship incurred by national programmes in these domains as a result of budgetary constraints has been needlessly exacerbated by a fragmentation of national agencies dealing with water resources assessment and by the lack of linkages to the water management process. At the country level, organizations of the United Nations system need to develop concerted approaches in order to assist Governments in the formulation and implementation of integrated information strategies aimed at maximizing the development and management value of information.

47. The seriousness of the situation with regard to the sustainable development and use of water resources worldwide warrants the periodic re-examination of progress and trends towards more sustainable pathways. However, the scope and extent of the analysis undertaken for comprehensive assessments will continue to be limited by both the scarcity of reliable information and the absence of national and international harmonized information systems and common methods of analysis of information unless steps are taken to improve the current situation. With regard to water quality, members of the ACC Subcommittee on Water Resources are in the process of developing a comprehensive water quality programme based on a carefully selected global network of representative drainage basins encompassing a broad spectrum of environments so that future extrapolation to unmonitored basins can be achieved. Given the need for the integration of existing information systems, the members of the Subcommittee are also taking steps towards linking various Web sites with a view to facilitating access to available information and facilitating the harmonization of methodologies.

## D. Capacity-building to enhance participatory approaches and improve institutional and regulatory frameworks

48. In view of the ever-increasing complexity of water resources issues, United Nations system organizations need to strive towards providing an integrated capacity-building framework in support of national efforts. National water sector assessments should thus be considered as a starting point for the identification of capacity-building needs and priorities, as well as the definition of capacity-building programmes, within the broader context of integrated water resources management. National Governments and United Nations organizations need to engage in long-term commitments to facilitate programmes for capacity-building as a steady and continuing process. Opportunities need to be taken for the networking of institutions, in particular for the exchange of experience and capacities among developing countries.

## E. Financing of water resources development and utilization

49. The enhancement of the effectiveness of United Nations system support provided to Governments in the formulation of policies for the generation and effective utilization of financial resources hinges on the ability of such support to assist Governments in fostering an enabling environment that encourages investments from both public and private sources, and in designing and implementing pricing policies for cost recovery, efficient allocation of water and water conservation, taking into account the country's level of development. This is of particular significance with regard to financing water supply and sanitation in fast-growing urban and peri-urban areas, as

well as for the organization of poor rural communities to enable them to generate the required financial resources.

50. Financial assistance in terms of grants and loans provided by the organizations of the United Nations system are and will remain small relative to total requirements. Nevertheless, in addition to the more traditional grants and loans, they can play an important role in leveraging investments from other sources, notably regional banks and funds, bilateral agencies, non-governmental organizations, national financial organizations and the private sector, including commercial banks. Organizations of the United Nations system can assist and are already assisting Governments to forge partnerships with the private sector, in the context of large urban areas and in leveraging activities in the form of loan guarantees or small loans for community water supply schemes in small towns, peri-urban areas and rural communities or for small-scale irrigation projects.

*Notes*

[1] The membership of the Subcommittee comprises Department of Economic and Social Affairs, Economic Commission for Africa, Economic Commission for Europe, Economic Commission for Latin America and the Caribbean, Economic and Social Commission for Asia and the Pacific, Economic and Social Commission for Western Asia, United Nations Children's Fund, United Nations Development Programme, United Nations Environment Programme, United Nations Centre for Human Settlements (Habitat), Office of the United Nations High Commissioner for Refugees, United Nations University, International Research and Training Institute for the Advancement of Women, secretariat of the United Nations Convention on Biological Diversity, secretariat of the United Nations Convention to Combat Desertification, secretariat of the United Nations Framework Convention on Climate Change, secretariat of the United Nations International Decade of Natural Disaster Reduction, Food and Agriculture Organization of the United Nations, United Nations Educational, Scientific and Cultural Organization, World Health Organization, World Bank, World Meteorological Organization, United Nations Industrial Development Organization, and International Atomic Energy Agency.

[2] See World Bank, *Water Resources Management* (Washington, D.C., 1993).

[3] Food and Agriculture Organization of the United Nations, *Water Sector Policy Review and Strategy Formulation: A General Framework* (Rome, 1995).

[4] Report of the Secretary-General on institutional and legal issues relevant to the implementation of water markets (E/C.7/1996/3).

[5] See IHE/UNDP, *A Strategy for Water Sector Capacity-Building* (New York, 1991).